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XXVI. *Several Accounts of the fiery Meteor, which appeared on Sunday the 26th of November, 1758, between Eight and Nine at Night; collected by John Pringle, M. D. F. R. S.*

Read Feb. 8, 1759. **S**INCE the paper concerning the meteor, of November 1758, was read at the Society, I have been favoured with several more observations relating to the same appearance, which I have connected with the former in such a manner, as that we may now trace the course of that body, from the south northwards, over a considerable part of this island; and at the same time form a better judgment of its figure, height, magnitude, and velocity, than what could be drawn from the first accounts only. At present, I shall lay before the Society all the inquiries I have made on this subject, and, in another paper, I shall offer a few remarks, containing the result of these observations.

I. I said at first, that I had not heard, that this body was observed any-where south of London, except at Silchester; but having since read in one of the Magazines, that it was seen at Plymouth, I wrote to Mr. Mudge, Surgeon in that place, to be informed about the truth of that article; who answered, "That he had made every inquiry in his power with regard to the meteor, and could find but two persons who pretended to have seen it, and those totally disqualified from giving him any satisfactory account"

“ account, either as to its magnitude, direction, the
 “ angle with the horizon, or degree of light: that
 “ they only saw in general (after the body of the
 “ meteor had passed) a red glaring flash, which
 “ seemed rather to excite astonishment in them than
 “ curiosity. In short, that nothing more could be
 “ collected, than that it was, or might have been,
 “ seen at Plymouth.”

Some time after, Mr. Mudge favoured me with another letter; in which he says, “ I think I can
 “ now venture positively to say the meteor was not
 “ seen at Plymouth. Besides a very minute and particular scrutiny among the people of the town, as
 “ I was apprehensive the narrowness of the streets,
 “ and height of the houses, might have been the
 “ cause of their not observing it, the Lieutenant-governor was so obliging, at my request, to send a
 “ serjeant to inquire of every soldier in the garrison;
 “ and as some of them must have been on sentinel
 “ duty that evening, I am thoroughly persuaded, if
 “ the meteor had appeared above their horizon, it
 “ could not have escaped them, as the garrison is
 “ situated on an eminence, and the prospect bounded
 “ by the sky only.”

Dr. Huxham also acquainted me, that he did not believe the meteor had been seen at Plymouth.

II. The reverend Dr. Shipley, minister of Silchester in Hampshire, a parish about 45 miles * W.S.W.

* Unless where it is otherwise expressed, I would be understood to use all along the standard English measure of $69\frac{1}{2}$ miles to a degree.

of London), told me, " That he had not a view of
 " the meteor himself, but had conversed with three
 " countrymen, his parishioners, who had seen it :
 " that they had all agreed in observing the light to
 " be greater than that of moonshine ; and that one
 " of them, in particular, said, it was so great that he
 " could easily have seen a pin lying on the ground :
 " that the body at first was like a large shooting star,
 " but with a slower motion : that its direction was
 " northerly : that, during its progress, it increased in
 " size, leaving a stream of light behind ; and at last,
 " as it declined to the horizon, its lower part became,
 " in appearance, as broad as his hand, whilst the
 " length of the whole seemed to be about five feet,
 " of a conical figure, ending in a point upwards :
 " that, before it reached the horizon, it burst into a
 " flame, resembling a flash of lightning, and then
 " immediately disappeared *." Dr. Shipley going to
 the spot where the observer had stood, and making
 him point to some trees at a distance, over which, he
 said, the meteor disappeared, the Doctor found, by
 taking the altitude with an instrument, that it had

* From this observation it appears, that the stream of light, called the tail, was not seen at first ; probably because the meteor was in too high a region for the air to make any resistance to the flame ; but when the body descended lower, then the air, tho' still extremely rarified, yet, from the extraordinary velocity of the meteor, would make some opposition to it, and drive the flame backwards to form the tail. That the meteor descended obliquely, will be more fully shewn afterwards, tho' the circumstance mentioned above *of a conical figure ending in a point upwards, as it declined towards the horizon,* is one proof of that fact.

been extinguished about $1^{\circ} 15'$ above the horizon, then bearing 35° westward of the north †.

III. As for this city, and the parts adjacent, all I could learn was likewise from a Magazine; in which it was said, "That the meteor was seen by three gentlemen in Chelsea-fields." It is probable, that, on that evening, the air was foggy hereabouts, or that there was no wind to carry off the smog; for these circumstances will easily enough account for there being no notice at all taken of that body in London, and that it was so little heard of in the neighbourhood.

IV. Having heard it was seen at Colchester in Essex, I desired the favour of Mr. Windham-Bowyer, commissioner of the excise, to employ some of the officers of that district to procure what intelligence they could about its appearance there. Accordingly Mr. Wigson, collector at Colchester, informed Mr. Bowyer, in answer to the queries sent him, "That he had found a person who had seen the meteor, on the 26th of November, about eight in the evening; and who said, that its direction, to the

† This bearing carries the meteor about a point farther to the westward than what is consistent with the common maps, and several of the following observations.

Upon the supposition that the observer was tolerably exact in pointing out the apparent altitude, at which the meteor disappeared, and that it was extinguished when nearly perpendicular to Fort William (in the Highlands of Scotland), as shall be shewn afterwards, then, allowing 22 miles for the curvature of the earth, and a distance of 420 miles between Silchester and Fort William, the real height of this body, at its disappearance, was about 32 miles.

"best

“ best of his judgment, was about south-east ; that
 “ the apparent diameter of the body was about five
 “ or six inches, not so large as the moon when at
 “ at the highest, but more bright ; that the meteor
 “ left a train of light behind it ; that its progress was
 “ extremely swift ; that no explosion was heard
 “ when it disappeared ; and that he did not perceive
 “ it to break into stars in the manner of a rocket.”

Finding this account disagreed so much with those I had received from other parts, with regard to the course, I wrote to Mr. Wigson, begging he would once more see the person, and desire him to point out the path of the body, in order that I might be satisfied he had not been mistaken about its motion to the south-east ; and, in return to my letter, that gentleman acquainted me, “ That he had
 “ again conversed with the observer, who still persisted in describing the course of the ball from the
 “ north-west to the south-east ; adding, that it appeared, at its greatest height, to have the same altitude which the sun then had (March 12), at 10 in
 “ the morning * ; but that it inclined to the horizon
 “ with great rapidity, and disappeared intirely, without dispersing, seeming to him to fall into a wood.”
 Mr. Wigson concluded with observing, “ that as this
 “ man was at that time on a journey from Thorp
 “ to Colchester, he might easily be deceived as to the
 “ points of the compass, by the windings of the
 “ road.”

V. In tracing the progress of this body northwards, I was favoured with the following letter from

* Viz. about 32°.

Fig.I.



Fig.II.

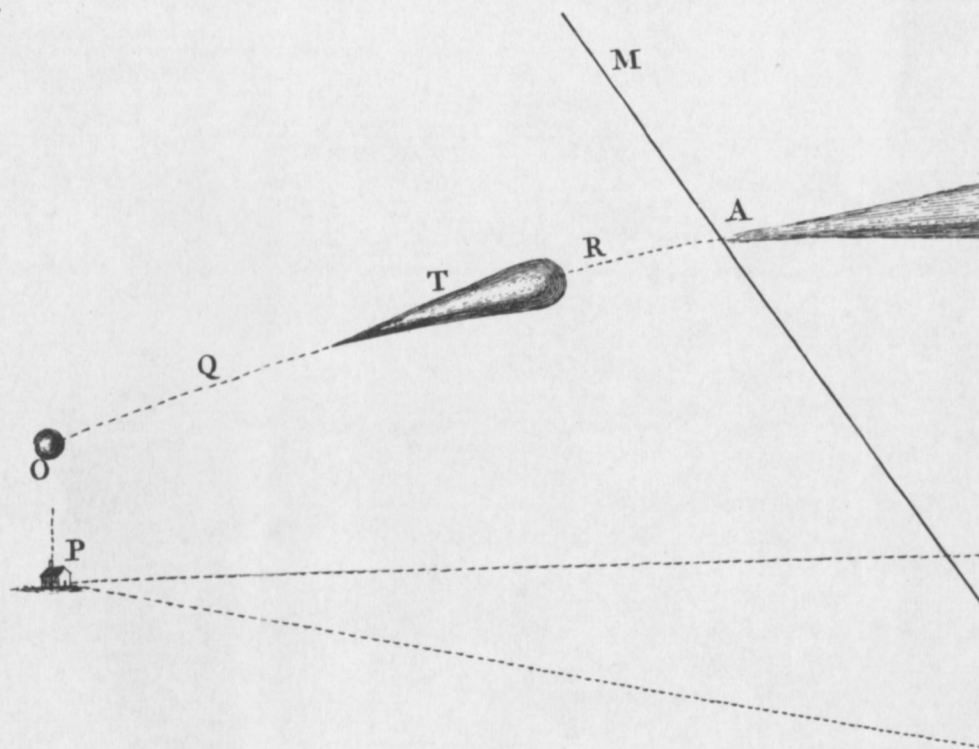


Fig.V.



Fig. III.

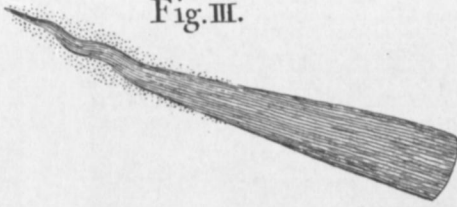
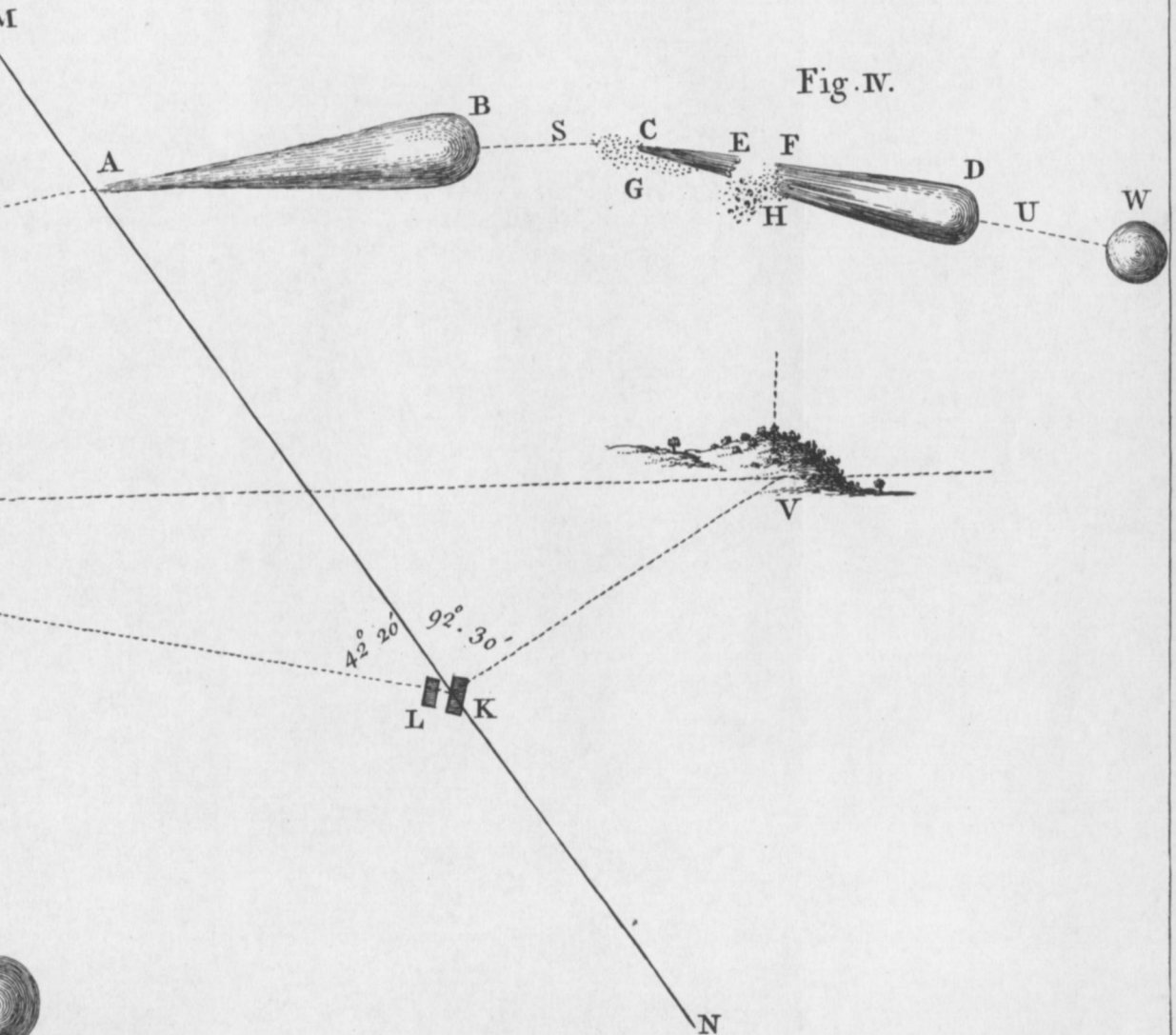


Fig. IV.



the reverend Mr. John Michell, fellow of Queen's College, Cambridge. " I promised to send you what
 " further account I could get from the person here,
 " a glazier by trade, who saw the meteor of the
 " 26th of November. I walked yesterday along
 " with him to the place where he was when he saw
 " it, taking with me a quadrant, to measure such
 " altitudes as he was able to give me from his memory, and a compass to take the bearing. The
 " first appearance, by the account he gave me, was
 " at least 70° high, and it appeared to move directly
 " perpendicularly *, till it came down to the horizon,
 " where it passed between two trees, which he pointed out to me : this last place of its appearance was
 " 23° west of the north from the place where he stood ; and, as we were at least a mile distant
 " from the trees, I believe you may depend upon that
 " bearing to a degree or two at most. The whole
 " time of the appearance was (as near as my informer
 " can guess), as long as he should be in walking near
 " 400 yards ; but in this, I imagine, he is somewhat
 " deceived, as I think I can collect, both from his
 " own account of it, and that of another person who
 " was with him, the time was much shorter. The
 " head, which went foremost (*Plate VII. Fig. 1.*)
 " was, by the description, of a bright white, like
 " iron, when almost of a melting heat ; but it emit-

* In a second letter, Mr. Michell says, " He asked the observer
 " several times, whether the direction of the meteor did not vary
 " to the right or left ; and that he had assured him, that, according to the best of his judgment, it appeared to move exactly perpendicularly ; whence it must have crossed the meridian in the
 " zenith, and moved in a great circle with regard to Cambridge."

“ ted no sparks, as iron does in that state. The head
 “ was about half the diameter of the moon, and, till
 “ it had descended to within about 14° of the hori-
 “ zon, was, as I apprehend by the account, some-
 “ what less in the vertical than in the horizontal dia-
 “ meter; but, from 14° high, it was at its utmost
 “ splendor, and round, and continued so till it disap-
 “ peared. The tail was about a fifth part of the
 “ breadth of the head (*Fig. 1.*), and when the head
 “ was about 27° high, was at the longest: the length
 “ then might be somewhat more than 8° , which
 “ was the mean length. The colour of the tail was
 “ a duskyish red, about the colour of red-hot iron,
 “ all of a breadth, not pointed. When the head was
 “ about 6° or 7° high *, the tail burst, as my
 “ informer expressed it, and the brightness of the
 “ light dazzled his eyes; after which the tail disap-
 “ peared, and in the room of it there were three
 “ stars, all contained within the compass of a little
 “ more than one degree from the head (*Fig. 2.*); and
 “ they, together with the head, descended, keeping
 “ their due distance, till below the horizon †.
 “ The diameter of these stars was nearly the same
 “ with the diameter of the tail, viz. about $3'$; but they
 “ were of the same colour as the head. The
 “ brightness of the light was so great, that (accord-

* Supposing this angle of elevation just, the real height of the meteor, when the tail broke off, over the shire of Lanerk in Scotland, was about 42 miles, allowing for the curvature of the earth.

† This circumstance of the head's falling under the horizon might have been a deception; for at Silchester, which was at a greater distance, the head disappeared before it came to the horizon; but, perhaps, the horizon was clearer and lower there than at Cambridge.

“ ing to the account I received) one might see to
 “ pick up a pin, and some noise was heard ; but of
 “ this latter, at least, I a little doubted, imagination
 “ being able to help out a good deal in such cases.
 “ The appearance was about half an hour after eight
 “ in the evening, on a Sunday ; but the day of the
 “ month, or the month itself, the man does not
 “ certainly remember. This is all the account I have
 “ been able to procure. The heights, &c. I could at
 “ first only get in, *as long as from here to that hedge ;*
 “ *as broad as a hat crown ; as thick as my wrist ; and*
 “ *about as long as a broom-staff :* but, as I thought these
 “ would give you no more ideas than they gave me, I
 “ desired my man to point out in the heavens, as near
 “ as he could guess, clouds, &c. of the same size,
 “ and then I measured them with a quadrant, and
 “ the result of these measures is what I have sent
 “ you.”

VI. Pursuing the progress of the meteor north-
 wards, my next information was from Manchester.
 Mr. Lloyd, of that place, Fellow of the Royal So-
 ciety, wrote, that tho' it had been seen there by se-
 veral, the only tolerable account he could send me
 from that country, was from Lord Derby's head gar-
 dener ; who said, “ As he was returning from Liver-
 “ pool to Knowsley (a place at 7 or 8 miles distance),
 “ about eight in the evening, he was surprised by a
 “ sudden glare of light ; and that he soon saw a ball
 “ of fire appearing, of half the breadth of the moon,
 “ moving horizontally eastward *, a little inclined to

* This person, like the traveller between Thorp and Colchester,
 has probably been deceived in the direction by the windings of the
 road.

“ the north, with a hissing noise : that a train of light,
 “ like a tail, followed it, which being soon collected
 “ into the body, it burst, and part seemed to fall down
 “ like stars, and the rest vanished. He thought the
 “ whole appearance continued about two minutes.”

VII. Mr. Lloyd added what follows from the
 Liverpool News-paper, dated 1st of December, 1758.
 “ On Sunday last was seen in West Derby *, by se-
 “ veral credible persons, between 9 and 10 o'clock
 “ at night, a ball of fire, which arose in the east, and
 “ appeared to increase in size for some time, and then
 “ burst, without noise. Its direction was to the
 “ northward.”

VIII. Cockermouth, in Cumberland, is about 86
 miles north by west of Liverpool. Mr. Muncaster,
 of that town, says, in a letter to a friend in London,
 “ That the meteor passed over that place † about
 “ nine in the evening, on November the 26th, with
 “ a very great velocity, towards the north-west ; that
 “ it gave so strong a light, that the smallest thing
 “ might have been seen on the pavement ; and that it
 “ disappeared in less than a minute : that the globe of
 “ fire appeared as large as the moon when she is high,
 “ but much brighter ; and had a tail of a conical
 “ form ; but that they did not observe any sparks or

* The district so called of Leverpool.

† *Over that place.* This expression we are not to understand
 here in the strictest sense, more than when used by the observer at
 Carlisle : besides, as the meteor really passed within a few miles of
 the vertical points of both those places, and probably was at that
 time above 60 miles high, it could not appear to decline much from
 the zenith.

“ stars fall from it, like those which are seen on the
 “ bursting of a rocket ; nor did they hear any ex-
 “ plosion.’

IX. From Carlisle, which lies about 26 miles N. E. of Cockermouth, the account I received was more particular, and for which I was obliged to Mr. James Hewit, wine-merchant of that city, who not only had a view of the meteor during part of its course, and heard a report, but, at my request, some time after, took the trouble to measure the height, at its apparent elevation when he saw it, and at its extinction, from the memory of another person, who had a sight of it to the last. I shall give the substance of several of his letters on this subject, in his own words.

“ The direction of the meteor was from south-east
 “ to north-west. It did not appear in a globular
 “ form, as it passed over Carlisle ; but tapered in the
 “ manner represented in *Fig. 3*. Its head seemed
 “ to be about 14 inches in diameter, and its length,
 “ from head to tail, about 5 yards. It appeared much
 “ brighter than the moon, and lightened the atmo-
 “ sphere to such a degree, that a person, who stood
 “ in the street, could easily have distinguished the
 “ difference between a small needle and a pin, if
 “ they had been lying on the ground before him. It
 “ emitted several sparks as it went along, and con-
 “ tinued in sight about 25 seconds. About a minute
 “ after it disappeared, there were two explosions im-
 “ mediately following one another, of a hollow
 “ noise, as loud as the report of a cannon at 2 or 3
 “ miles distance ; and, immediately after the explo-
 “ sions, there was heard a confused rumbling noise

“ in the air, which continued at least 20 seconds; at
 “ the same time I could perceive no wind, and the
 “ stars were remarkably bright. As for the greatest
 “ altitude, which you desire to be informed about, as
 “ I could very well retain that in my head, a gentle-
 “ man in town, and myself, took that height with a
 “ theodolite, by pointing the instrument to that part
 “ of the heavens I saw the meteor in; and in this I
 “ could be very exact, as I took particular notice of
 “ its apparent elevation above a certain high house
 “ it seemed to pass over. We found the greatest
 “ height to be 32 degrees above the horizon, on a
 “ vertical circle; and 41 degrees from the north to-
 “ wards the west *. As I did not myself see the me-
 “ teor extinguished, by reason of some houses that
 “ were in the way, I found a person in this neigh-
 “ bourhood, who had seen it to the last; and getting
 “ him to point to that part of the heavens where it
 “ disappeared, we also took that height with the
 “ theodolite, and found it eight degrees †. This
 “ man seeming to be pretty sure of his pointing to the
 “ very place in question, I believe you may depend
 “ on the observation as tolerably just. As for the
 “ figure (*Fig. 3.*), you have it as correct as I could

* It appears by this observation, that the meteor being so low as 32°, it must have passed the town a great way before Mr. Hewit got a sight of it.

† The meteor being extinguished when perpendicular to Fort William (as will appear by a subsequent observation), at the apparent altitude of 8° at Carlisle, makes the real height at Fort William to have been between 26 and 27 miles, allowance being made for the curvature of the earth, of 3½ miles, between these two places.

“ make

“ make it ; only, perhaps, I have added too many
 “ sparks, as I doubt there did not so many issue from
 “ the tail. The meteor did not discharge any sparks
 “ nearer the thick end, than are described in the
 “ figure ; but those it did emit, darted from it with
 “ an astonishing velocity. In answer to what you
 “ require in your last (viz. whether the path of the
 “ meteor was to the eastward or westward of Car-
 “ lisle ?) my situation, when I saw it, was near the
 “ center of the town ; and the bearing of that part of
 “ the house, over which I saw it, was 41° from the
 “ north towards the west ; and as its progress ap-
 “ peared on the left side of me when facing the said
 “ house, the path was consequently west of me, and
 “ of any part of this city *.”

X. Mr. Jonathan Ormiston, merchant at New-
 castle, favoured me with all the information he could
 procure in that part of the country. It consisted of
 an abstract from the Newcastle Journal, and the copy
 of a letter from Mr. Martin Doubleday, one of his
 friends near Durham, whom he calls a gentleman of
 sense and knowledge. The article from the Journal
 is as follows. “ Newcastle, 26th of November,
 “ 1758. This night a surprising large meteor was
 “ seen here, just about nine o’clock, which passed a
 “ little westward of the town, directly to the north,
 “ and illuminated the atmosphere to that degree for
 “ near a minute, that, tho’ it was dark before, one

* From this last circumstance, compared with observations V.
 and XIII. we are enabled to judge nearly of the true path, which
 must have run from Cambridge across the Solway frith, between
 Carlisle and Dumfries, and by Obs. XVI. on to Fort William.

“ might

“ might have taken up a pin in the street. Its velocity was almost inconceivably great ; and it seemed near the size of a man’s head. It had a tail about two or three yards long ; and, as it passed, some say they saw sparks of fire fall from it. It appeared low in the atmosphere ; and we are advised from Edinburgh, that it passed over that city * just about the same time, had the same appearance, and moved in the like direction.”

Mr. Doubleday’s letter.

XI. “ On the 26th of November last, about a quarter before nine, as I was sitting writing by candle-light, with my face towards a window fronting the north-west, I was surprised by a sudden and extraordinary light, and stepping hastily to the window, saw the resemblance of a large sky-rocket, falling and bursting into sparks of fire, which became more scattered in its descent, and seemed to be quite spent by that time it reached the horizon (which it did, as near as I could guess, due north †), its path appearing luminous to a considerable distance from the scattered parts, which with it were not dispersed, but as if confined between two parallel straight lines. The greatest height of its luminous path, when I first saw it, was 25 degrees above the horizon, N. W. by N. I heard no noise at the time, nor after ;

* By the accounts I had from Edinburgh, it was not nearly vertical there.

† The head of the meteor, seen from this gentleman’s house, could not reach an unobstructed horizon, nor be seen due north by 3 or 4 points, consistently with most of the other observations.

“ and

“ and I conclude from its appearance, that it must
“ have begun to burst before I saw it.”

Dated from Butterby, about a mile
south of Durham *.

XII. Mr. Blake, Fellow of the Royal Society, sent me the observation of the reverend Mr. William Henderson, vicar of Felton (a village about 24 miles N. N. W. of Newcastle); who says, “ That
“ the night was dark and calm; that as he was going home (a little after nine), about 20 yards west
“ of the bridge, the road was instantly so much enlightened, that he might have seen to take up a pin;
“ that the globe, to the eye, was about the size of a
“ ball of 6 or 7 pounds weight ‡; that he could not
“ guess at its distance from the earth, but, during
“ the short time he saw it, he imagined he heard it
“ whizz over his head †; that it had a tail like that
“ of a comet, almost a yard in length, perpetually
“ emitting sparks of fire; that the time of observation
“ was very short, on account of a great hill that rises
“ on the south side of the river Coquet, and of a
“ clump of trees on the north side, which obstructed
“ his view; that its velocity was great, for that it
“ did not continue in sight above 5 or 6 seconds; and
“ that its course, as near as he could judge, was to
“ the north-west.”

* Durham is about 59 miles from Carlisle eastward.

‡ The observer probably means a cannon ball of a six-pounder.

† This sound must have been a deception, as shall be shewn afterwards.

These were all the accounts of the progress of the meteor, which I could procure in England: I shall next lay before the Society the observations I have had from Scotland; and as I have begun, I shall continue to trace the appearance from the south northwards.

XIII. Dr. Gilchrist, physician at Dumfries (which lies a few miles north of the Solway frith, and about 30 miles N. W. by W. of Carlisle), acquainted me, " That the best account he could get of the meteor " (which he did not see himself), was from a young " man of that place, who, in common affairs, was " sensible and distinct. This person, on the 26th of " November, 1758, in the evening, being in a room on " a first floor, which had the windows to the north- " east, was surprised by an extraordinary light, and, " running to one of the windows, saw a large fiery " body, like red-hot iron. It appeared to him as large, " and as long, as a middle-sized man, the fore part " broadest; its progress was from S. E. to N. W. part " of the tail separated from the rest, but he still " thought it followed the body for a little space, and " then it burst like gunpowder, tho' without noise, and " fell down in sparks of fire, whilst the body kept on " its course*; but which he immediately lost sight " of, by a house of two stories high that intervened." The doctor said further, that the same person formed his judgment of its height " from one of the steeples " of the town, a hundred feet high;" but, as the

* The circumstances contained in this paragraph agree perfectly with the account of the farmer at Ancram. See Obs. XVI.

distance of this steeple from the observer is not mentioned, nothing can be made of the apparent altitude from that description, more than of the distance eastward, “ which, letting fall a perpendicular from the meteor, he imagined, was not above a good gunshot from him.”

Dr. Gilchrist added, “ That a young lady of his acquaintance, happening to be in the street near the same place, saw the meteor likewise, and described it as a ball of fire, about the bigness of the sun, with a tail; and the length of the whole as longer than one’s arm. She said, it was almost over her head *, higher than the steeple mentioned before; that it burst without noise, and was intirely dissipated into sparks of fire, which fell down, and, as she thought, almost reached the tops of the houses.”

XIV. The reverend Mr. William Turnbull, minister of Abbotrule (a parish about 46 miles N. by E. of Carlisle, 44 miles N. E. by E. of Dumfries, and 6 miles S. W. by W. of Jedburgh, in the shire of Roxburgh), favoured me with a letter, containing the following particulars, “ That on Sunday the 26th of November, 1758, about nine at night, sitting in his parlour, which had a south-west window, he very distinctly saw a light, which he took for a flash of lightning; but was surpris’d with the difference of its colour, as being whiter, and giving a clearer

* From this circumstance, and the greater apparent magnitude at Dumfries than elsewhere, it is probable the meteor was more nearly vertical there than at Carlisle, or any other place of observation mentioned.

“ view of the pictures, and every thing else in the
 “ room, than what he could have expected from com-
 “ mon lightning; that, however, he waited for a
 “ clap of thunder, and accordingly, at the end of five
 “ or six minutes, he heard a very great explosion, not
 “ indeed so like thunder, as the crashing noise of the
 “ fall of a house; and being persuaded that this was
 “ really the case, and that the gabel-end of his own
 “ house, farthest from the room he sat in, with the
 “ offices, had fallen, he ran out, but found no damage
 “ done, nor saw any clouds, it being clear star-light.”

XV. Having written to Mr. Walter Pringle, sheriff-depute of the shire of Roxburgh, for what information he could give from that part of the country, he acquainted me, “That he himself had neither seen
 “ the meteor, nor heard the explosion; but that a
 “ servant of the house, where he happened to be
 “ that night (about 20 miles S. S. E. of Edinburgh,
 “ and as far N. N. W. of Abbotrule), came in
 “ about nine, and told him there had been some
 “ thunder and lightning; which he thought very im-
 “ probable, as he had been out but a few minutes
 “ before, and had not seen a cloud in the sky’.

Mr. Pringle added, that the reverend Mr. John Smith, of Jedburgh, had written to him as follows:
 “ I am surprised, that, in all the accounts given of
 “ the meteor, seen on the twenty-sixth of Novem-
 “ ber, one remarkable circumstance is omitted,
 “ namely, the horrid crack, which I heard, being
 “ then on the confines of Cumberland, near Stone-
 “ garthside (about 15 miles N. by E. of Carlisle): it
 “ was much louder than the report of any heavy
 “ cannon, and continued about 7 or 8 seconds. The
 “ people

“ people thought it a peal of thunder ; but this, I
 “ imagined, could not be the case, as the sky was not
 “ clouded. I did not see the meteor myself, being
 “ then within doors.”

XVI. In another letter, Mr. Pringle informed me, “ That he had conversed with one James Turnbull, a farmer at Ancram, a village about three miles north-west of Jedburgh, who had seen the meteor, and heard the explosion, and who being a very sensible man, he thought he could not give me greater satisfaction, in answer to my queries, than by desiring him to write me a full account of what he had seen and heard.” Accordingly I received the following letter from that person.

“ At Mr. Pringle’s desire, I send you an account
 “ of the meteor, as it appeared to me on Sunday the
 “ 26th of November, 1758. My dwelling-house,
 “ at the mill of Ancram, fronts south-east ; and the
 “ mill-house, which is directly before it, has the same
 “ exposition, at the distance of about twelve yards.
 “ About nine at night I happened to be out, and
 “ upon returning to my house, and just entering the
 “ threshold, the whole side of the house became
 “ suddenly enlightened, and with a brightness as
 “ of sun-shine. My back being towards the place
 “ from whence the light came, I quickly turned
 “ about to see what might be the cause of it, and
 “ then beheld a globe of fire about the bigness of the
 “ crown of the cap I commonly wear, 6 or 7, or at
 “ most 8 inches in diameter *, directing its course
 H h 2 “ from

* After receiving this letter, I wrote to Mr. Smith, to desire him to ask Mr. Turnbull, how many inches in diameter the full moon appeared

“ from a shepherd’s house (which stood at above a
 “ mile’s distance) towards me, as I thought, and right
 “ over the middle of the mill-house. I scarce had time
 “ to think, when it passed by me to the north-west
 “ with a very great swiftness, and very high in
 “ the air. When it came opposite to the gabel-
 “ end of the dwelling-house, I then discovered its
 “ true figure: it was perfectly round at the great
 “ end, which went foremost, and tapered three or
 “ four yards, to my imagination, in length †. Being
 “ resolved to see it as long as I could, and fearing
 “ the wall and roof of my house might intercept the
 “ view (for I was then standing in the threshold), I
 “ moved six or seven yards farther off the house,
 “ keeping my eye fixed upon the meteor, and ob-
 “ served, that it had not gone above a quarter of a
 “ mile, when one-third towards the small end broke
 “ off; which third separated into sparks of fire, resem-

appeared to him when at the highest above the horizon; his answer was, about 12: hence the apparent diameter of the meteor, to this observer, was not above one half, or at most two thirds, of the apparent diameter of the full moon at its greatest height. But whereas this person saw the meteor first, when it could not be much farther advanced to the northward than Cambridge, the apparent magnitude must have been considerably increased by the time it came opposite to the gabel-end of his house, where it was not at above the third part of the first distance. If therefore we allow, that when seen at the largest at this station, the diameter of the head was only equal to the apparent diameter of the moon at the same height, we shall find the real diameter of the meteor to have been about half a mile, upon computing its distance from the village of Ancram.

† Having afterwards inquired, whether the head was of a globular form, distinct from the tail, he answered, “ that he could be
 “ assured, that the appearance was as in the figure; and that the
 “ head and tail formed one tapering stream of light.”

“ bling

“ bling stars, and immediately vanished. Soon there-
 “ after the remaining body vanished also, directly to
 “ the north-westward of my house, and the former
 “ darkness returned *. At this time, I imagined I
 “ still saw the intire figure of the body in the air,
 “ tho’ perfectly black ; but I have been since told,
 “ that this appearance might have been only a de-
 “ ception, occasioned by the brightness of the body
 “ striking the eye ; as when we first look at the sun,
 “ and then turn our sight to the ground, or a wall,

* I also inquired of the observer, by Mr. Smith, whe-
 ther the body went on for some time in its progress northward,
 after the separation of part of its tail, or instantly vanished ? The
 answer was, “ That the tail (meaning the part which broke off)
 “ went into sparks, and instantly vanished ; that some sparks came
 “ from the body also ; but that it went forward a little way before
 “ it was extinguished ; viz. so far as that he could be assured it bore
 “ then due north-west of him.” Upon this information, in order
 to know the place of extinction, I drew on the map a line north-
 west from Ancram, till it intersected the line of direction of the
 meteor, and found, that this point, by Elphinston’s map of Scot-
 land, lay near Fort William ; by Moll’s map of Great Britain,
 the intersection was carried as far to the northward and westward as
 the west end of the isle of Skye : but as I relied most on the former, I
 have referred the extinction to a point perpendicularly above Fort
 William. As for the separation of the tail, that other remarkable
 period, according to Mr. Pringle’s measures, it must have happened
 when the meteor was vertical to the southern and western part of
 the shire of Lanerk, near the borders of the shire of Air, as was
 observed before.

With regard to the apparent variation of the height, to the ob-
 server at Ancram, Mr. Smith wrote as follows, “ You inquire,
 “ whether, at the first sight James Turnbull had of the meteor, it
 “ appeared to be as high as it did afterwards, when opposite to his
 “ house ? His reply is, that, at first view, it appeared indeed
 “ lower in the air than it did afterwards, which he ascribed to the
 “ greater distance ; but that he cannot say, that, at the end of its
 “ course, it was certainly lower than when he saw it first.”

“ we

“ we fancy we still see the figure of the sun, but of a
 “ dark colour. Upon going into my house, I looked
 “ at my watch, and found it five minutes after nine.
 “ The time of the meteor’s appearance, during my
 “ observation, might be near a minute. After I had
 “ been in the house about five minutes, I heard a
 “ noise, like a clap of thunder, of some continuance;
 “ and, upon my daughter’s saying, there is thunder,
 “ I said, that could not be; for that I had seen no
 “ clouds when I was out. Upon this, I went out
 “ again, and found no clouds, but clear star-light.
 “ Several of my neighbours in the village of An-
 “ cram (which lies about 300 or 400 yards from
 “ me, a little westerly of the south, and over the
 “ middle of which the meteor passed, according to my
 “ imagination), likewise saw the meteor, and heard
 “ the report. One of them in particular says, that
 “ the noise came from the fire as it went along; but
 “ I cannot be persuaded of this, for, during the time
 “ of the light, I did not hear the least hissing sound,
 “ nor a noise of any kind. Another of my neigh-
 “ bours in that village, who heard the report, said,
 “ it sounded to him like a crashing noise, and in such
 “ a manner as made him imagine, that the gabel-
 “ end of his own and his neighbour’s house, which
 “ were contiguous, had fallen down at a time. I
 “ have been told, that the continuation of the noise,
 “ heard by our family, might have been owing to
 “ the particular situation of the house. It stands in
 “ a hollow, near the brink of the Ale, greatly over-
 “ topt by very high banks, partly of rock, partly of
 “ clay, and very steep, which lie along that river.
 “ Upon the top of these banks, to the westward of
 “ my

“ my house, and farther up the stream, is a large
 “ plantation, and it was directly over those trees that
 “ the meteor disappeared. In this case, the sound
 “ must have come down some part of the trough
 “ formed by the banks of the river; and it is be-
 “ lieved, that the continuation of it might have
 “ been occasioned by an eccho from the rocks, and
 “ the ruinous walls of an old monastery, which
 “ stands on the other side of the water, just opposite
 “ to my house: whereas the village of Ancram lies
 “ off the trough of the river on a rising ground, on
 “ a level with the plantation, over which the me-
 “ teor seemed to break. With respect to the height
 “ of that body, all I can say is, that I thought it
 “ very high, and can be positive it was nearer what
 “ Mr. Pringle calls the zenith than the horizon. I
 “ have pointed out the place to that gentleman, as it
 “ appeared to me; and, as he is to take the height
 “ of it with an instrument, he will be able to inform
 “ you more exactly.”

XVII. Before I received this letter, Mr. Pringle had sent me the figures of the meteor, which James Turnbull refers to. They were drawn by Mr. Smith, in presence of the observer, and by his direction. *See Fig. 4.*

A B represents the meteor intire, after it had come fully in view. C D represents the same, after the separation. C E the third part of the tail separated. D F the head, with the remaining part of the tail. G the sparks of fire issuing from the part of the tail separated. H the sparks

sparks emitted from the remaining tail, where the separation was made. W the meteor reduced again to a round form, after losing its tail.

Here it may be proper to observe, that, with regard to the sparks, some part of them are marked in the figure somewhat different from what they are described in James Turnbull's letter. There he only says, that the third part of the tail, which was broken off, separated into sparks of fire; without taking notice of the sparks that likewise issued from the remaining part of the tail, which however was a circumstance he mentioned to Mr. Smith, when that gentleman drew the figure.

Some time after this letter, Mr. Pringle acquainted me, " That he had been at the farmer's house; that
 " he had surveyed all the places mentioned in his
 " letter; and, to make the whole perfectly clear, he
 " had drawn a plan, containing the apparent course
 " of the meteor, its apparent intersection with the me-
 " ridian, and the bearings of all the places mentioned
 " in the observer's letter." *See the same Figure.*

K the farmer's house. L the mill. M N the meridian line. P the shepherd's house, over which the meteor first appeared, making an angle M K P of $42^{\circ} 20'$ with the meridian. V the hill and trees, apparently over which the meteor broke, making an angle M K V of $92^{\circ} 30'$ with the meridian. The line P V the horizon. O the meteor seen first in a round form over the shepherd's house. T the meteor beginning to appear in its proper form. P Q R U the path of the tail broke off over the trees.

These

These figures of the meteor are made much larger than they ought to be, in proportion to the other objects, in order the better to represent its true form.

After making this survey, Mr. Pringle got the farmer to point to that part of the heavens to which he referred the meteor, when opposite to the gabel-end of his house; and the observer seeming to be well assured of the place, Mr. Pringle took the altitude with an instrument, and found, after three trials, the height to be about 58° *. He concluded with saying, “ That, in answer to some more queries of mine, the farmer had told him, that he had observed little rising or falling of the meteor during its whole course; but that its motion, from the time he first saw it, to its extinction, seemed to be nearly in one straight line, at an equal height above the horizon †; and that the light was continued and uniform, without any fresh burstings of flames from either the head or the tail.”

XVIII. All the information I received from that part of the country, over which the meteor seemed to break, was from Lord Auchenleck, one of the judges in Scotland, whose lands lie in the shire of Air, bordering on the shire of Lanerk. That gentleman was then at Edinburgh; but was so ob-

* At this time the meteor must have been vertical, about two or three miles to the southward of Lochmabin, a town in the shire of Dumfries distant from the observer about 37 miles, and from that place where the tail afterwards broke off 31 miles. From the altitude given here, I have computed the real height, at this place, to have been about 59 miles.

† This remark must be corrected by the last paragraph of the last note of Obs. XVI.

liging, as, at my request, to make all the inquiry he could among the people on his estate, and his neighbours; but could procure me no other account than what is contained in the following letter, which he had from his gardener. “ In obedience to
 “ your lordship’s orders relating to that great meteor,
 “ which made its appearance upon the 26th of No-
 “ vember, 1758, as I did not see it myself, I cannot
 “ give such a particular account of it as I could wish;
 “ but what I can collect from sundry folks in this
 “ neighbourhood, is as follows. About a quarter
 “ after nine that night, there appeared from the
 “ south-east a very great illumination or light, which
 “ instantly made such a splendor, that, to a consider-
 “ able distance, one could most distinctly see houses,
 “ trees, water, stones, &c. but could not observe
 “ any particular body from which the light issued,
 “ nor that it ran farther westward; from which we
 “ may conclude, that it had then broke. No noise
 “ was heard, and no such thing as any ashes were
 “ found, that I could hear of. During the preced-
 “ ing part of the day, we had a strong and very
 “ cold south-east wind, with a little frost; but the
 “ evening was more calm.”

Signed, *James Bruce.*

From this letter it appears, that the sky in those parts, as about London, was then so much clouded, as to hide the body of the meteor, tho’ the light of it was very manifest, and which, I presume, was the brighter there for the bursting of the tail, and its dissolution into sparks of fire, when almost vertical to the observers.

XIX. Sir

XIX. Sir Robert Pringle, who was at Stitchill, (about 10 miles N. N. E. of Jedburgh, and about 60 miles, nearly in the same direction, from Carlisle), wrote as follows. “ I did not see the meteor you mention, “ nor have I yet met with any body that observed “ it, further than the great light with which it was “ attended, making every thing to be seen on the “ ground as distinctly as in sun-shine, and which “ continued, as they said, much longer than a com- “ mon flash of lightning from thunder. At that “ time I happened to be sitting, with some of my “ family, in the parlour, and all of us heard a “ noise we could not account for, as sounding “ like a gun fired off in the garrets, or a cannon “ discharged about a quarter of a mile from us ; but “ the noise continuing like thunder at a distance, we “ concluded it was nothing else, till one of the maid- “ servants came in, and told us, she had seen a very “ surprising flash of lightning, both for its clearness, “ which she compared to noon-day, and for its con- “ tinuance ; but she did not hear the report, which, “ I suppose, was occasioned by the noise of her own “ feet : for all the rest of our servants, that were sit- “ ting, and several other persons in the neighbour- “ hood, heard it much as we did. Some of our “ Edinburgh news-papers describe the body of that “ meteor to have been like a large star coming from “ the southward, and ending in the northward, both “ points westward of the observer, with a train after “ it, in form like a cone ; and with several sparks “ falling from it as it went along. These accounts “ say nothing of the length of this luminous appear- “ ance ; but that it seemed to be about 10 or 12 “ inches

“ inches broad at the head; nor do they mention
 “ any found that was heard after it vanished. A
 “ gentleman from Berwick told me, that he had
 “ spoken with a master of a trading vessel there, who
 “ saw this meteor of November last, as he was sail-
 “ ing in the Baltick, and in the same form it ap-
 “ peared in this country; but did not mention its
 “ height, nor direction.”

XX. Mr. Redpath, son of Mr. Redpath of Angelraw (a place about four miles north-east of Stitchill, in the shire of Berwick), says in a letter, dated from his father's house, “ That he did not see the
 “ meteor himself, nor had found any intelligent per-
 “ son who had seen it throughout its whole course;
 “ but that the best account he could procure was
 “ from one Mr. Mack, a farmer in the neighbour-
 “ hood, tho' he too had only observed it a little before
 “ its disappearance. That, from all he could gather,
 “ it was seen on Sunday the 26th of November,
 “ about nine at night; its direction was from the
 “ south-east to the north-west (but nearer the south
 “ and north points than the east and west), with a
 “ tail of a considerable length, pointing down-
 “ wards*, inclining to the east; that its course
 “ seemed to be very quick, and that sparks of fire
 “ fell from it as it moved along; that the whole was
 “ of a conical figure, and appeared to be about five
 “ inches at its basis; that a very strong light issued
 “ from it, which, in those houses where the candles

* This circumstance of the tail pointing downwards, is contrary to the other observations, and must have been a deception.

“ were

“ were out, darted thro’ the windows with such
 “ strength, that the rooms were wholly illuminated by
 “ it for 7 or 8 seconds; that its first appearance was
 “ not exactly at the horizon, but a little above it *,
 “ and that, at its greatest height, it certainly did not
 “ exceed 40 degrees; that it was extinguished before
 “ it reached the horizon, perhaps by about 8 or 10
 “ degrees †; that the colour of the meteor was at
 “ first nearly of a pure white, but, in proportion as
 “ it advanced, it grew red, and seemed to go out all
 “ at once; that the light, which issued from it,
 “ seemed rather to consist of successive flashes from
 “ side to side, than of an uniform regular flame; that
 “ a few minutes after its disappearance (not above
 “ three or four) was heard by several people a violent
 “ thunder-clap, or something very like it, and from
 “ the same point it disappeared, viz. rather nearer to
 “ the north than the north-west.”

XXI. At Dalkeith (a market town 6 miles south-
 east of Edinburgh), a gentleman, who happened to
 be walking eastward in the street, perceiving his right
 side and arm strongly illuminated, suddenly turned
 his face to the light, and saw the meteor, “ then in

* By Obs. XVI. the first appearance must probably have been
 a good way above the horizon; but Mr. Redpath says, he had
 met with no person he could depend upon for the account of the
 first appearance.

† Angelraw being, within a few miles, of the same distance
 from Fort William as Carlisle, we have, by this last circumstance,
 a confirmation of the real height of the meteor at its extinction,
 upon comparing with this observation the notes of No II. and
 No IX.

“ a direction at right angles with the street †, having
 “ an altitude, as he conjectured, of about 45 degrees ;
 “ he observed that the figure was oval, the light great,
 “ and of a blueish cast ; but he heard no sound.”

XXII. By an article published in the Edinburgh news-papers, “ the meteor appeared there of a conic
 “ form, about 5 or 6 inches broad at the basis, and
 “ lasted 5 or 6 seconds ; its light was great, and
 “ sparks flew from it like those of a rocket, when its
 “ force is spent.” I wrote to Dr. Whytt, Fellow of
 the Royal Society, for more particulars from Edinburgh ; but he returned for answer, “ That he had
 “ not seen the meteor himself, nor any body that
 “ had made proper observations upon it ; the rest
 “ could only tell they saw a ball of fire, which emit-
 “ ting several sparks in its progress, moved quickly
 “ along the south part of the hemisphere, and then
 “ disappeared.” He added, “ that, on the night
 “ preceding that on which the meteor was seen, he
 “ had observed a very bright *aurora borealis*.”

XXIII. One of my friends acquainted me from Edinburgh, that the article in the Glasgow paper was to this purpose. “ About nine o'clock last Sunday
 “ night (viz. on November the 26th), a globe of fire
 “ came over this city from the southward, in ap-
 “ pearance as large as the full moon. It made the
 “ streets as light as at noon-day, lasted about a mi-
 “ nute, and, just before it vanished, it divided into

† The street, to the best of my remembrance, lies nearly north-north-east and south-south-west.

“ three parts directly over the middle of the town,
 “ and then ascended through the atmosphere *.”
 Mr. Smeaton, Fellow of the Royal Society, happened
 to be that night at Glasgow; but did not see the
 meteor, nor staid long enough to get any tolerable
 account of it. From the information he had, he
 judged it was not so vertical as the news-writer of
 that place has represented it.

XXIV. From Dunfermline (a town in the shire of
 Fife, about 14 miles north west of Edinburgh), Dr.
 Stedman acquainted me, “ That he had only found
 “ two persons who had seen the meteor, a man and
 “ his wife, from whom he had the following parti-
 “ culars. That the figure was such as was delineated
 “ in the paper (*Fig. 5.*) which he sent me; that the
 “ first view they had of it was in the south-south-
 “ east, as it came from behind a building; and that
 “ it seemed to them to move westward; that the
 “ hinder part or train emitted large sparks or globules
 “ of flame, such as are seen to fall from a sky-rocket,
 “ when it begins to break; that its altitude was
 “ about 24° , which he had taken with an instru-
 “ ment, upon their shewing him how it seemed to
 “ move along the roof of a church, after bringing
 “ him to the window where they stood to see it;
 “ that they lost sight of it before it was extinguished,
 “ by a steeple that stood in the way; that its head

* I desired a gentleman at Glasgow to ask the writer of the
 paper, what he meant by this last expression; but he received no
 satisfactory answer, and could furnish me with no better materials
 from that place.

“ or fore-part appeared somewhat broader than the
 “ full moon ; that no sound was heard after its dis-
 “ appearance ; that the time was about nine at night,
 “ on Sunday the 26th of November *.”

XXV. In

* When Dr. Stedman sent me this account, he had omitted taking the bearings ; but, in his next letter, he told me, “ he had supplied that defect, and found, that the first appearance to the observers (when the meteor came from behind the building that intercepted the sight of it), had been about south by east $\frac{1}{2}$ east ; and that it had disappeared behind the steeple at about south by west $\frac{1}{2}$ west ; that, during this short course, it neither seemed to them to ascend nor descend.”

By Moll's map, the first of these bearings intersects the supposed tract of the meteor in Westmorland, about 14 miles west of Appleby, distant about 102 miles from Dunfermline ; but cuts the tract so obliquely, that a very small error in the bearing, or in the path of the meteor, would make a considerable difference in the following calculation. The other bearing cuts the tract near the south-west corner of the shire of Lanerk, distant about 46 miles from Dunfermline.

The above measures being in miles of 60 to a degree, give the height of the meteor, when first seen at Dunfermline, to be about 54 statute miles, and at the last bearing to be about 24 statute miles, upon making allowance for the curvature of the earth. I suspect, that the observers here made the apparent altitude too low ; but, however that may be, from hence the dipping or obliquity of the course downwards is manifest.

It was said, that the head was somewhat broader than the full moon. Let us give some allowance to the imagination, and suppose the head was but equal to the full moon, and that only when the meteor was at the nearest. In this case, as the distance of the moon from the earth (about 240000 miles) is to the real diameter of the moon (about 2180 miles) ; so was the distance of the meteor (about 59 miles) to its real diameter : which will thus be found to be about half a mile. But if the apparent diameter of the head at its first appearance (that is, at the greatest distance from the observers), was equal to that of the full moon, then the real diameter of the meteor was about $\frac{1}{2}$ or $\frac{1}{3}$ part more than a mile. If it was indeed somewhat larger than the moon, then the real diameter might have been

XXV. In January after, I saw here one Mr. Cairns (a young man then appointed surgeon's mate to one of the regiments at Gibraltar), who told me, " That he had seen the meteor, of the 26th of November, about 9 o'clock at night; that he was then in the shop of Mr. Oliphant, surgeon-apothecary at Culrofs (a town about 19 miles W. N. W. of Edinburgh); that Mr. Oliphant and he were surpris'd by a sudden glare of light from the street, coming, as it were, in successive flashes, but without any intervals of darkness; that they both ran out, and observed a ball of fire moving, with great velocity, in a direction nearly from the south-east to the north-west; that its height seemed to be considerable; but that they had not seen it to the last, by reason of some houses on the north side of the street, which stood in their way; that it was somewhat of a less size than that of the full moon, when about the same height above the horizon; and of an oval figure, with the longest diameter in the course of its direction. He observed no tail, nor sparks of fire issuing from it; but said, that some people of the town had taken notice of the latter; that the meteor itself was of a reddish fiery colour, though the reflection of the light from the streets was of a yellowish cast; that he heard no explosion himself, and had met with none who pretended to

been about two miles; which is the length resulting from the observation made at Dublin, as will afterwards appear. But, in such cases, the most moderate computations are most likely to be true; so natural is it for the imagination to magnify all objects that alarm it.

“ have heard any noise, either during the appearance of the body, or after its extinction.” Having inquired how long the light continued, Mr. Cairns answered at first, “ he believed about a minute or two ;” but, upon looking at a watch, which had a second-hand, and desiring him to recollect the time from the first glare of light till the return of darkness, he stopt me when I had counted 13 seconds *.

XXVI. I wrote to Dr. Simson, professor of medicine in the university of St. Andrews (which lies about 31 miles N. E. by N. of Edinburgh), who answered, “ That his family had been alarmed by the light, and that one of them cried out, the heavens were all on fire ; that his son (a minister)

* This account of the time is most likely to be the nearest to the truth ; since, without examining it in this manner, those, who are unaccustomed to measure such small portions, will generally reckon it much longer than it really is. I have been confirmed in my opinion about the shortness of the time, by the observation of another gentleman, who, being that evening at a friend's house in the shire of Haddington, saw the light, without seeing the body. I desired him to recollect the time, whilst I counted it, and in three trials, he stopt me pretty exactly at 8 or 9 seconds. He imagined he could not lose above 2 or 3 before he saw the light. Mr. Dutton, watchmaker in Fleet-street, who, since this paper was first presented to the Society, happened to see another meteor, which had a course little shorter than the other, told me, that he could be assured, it was over in about four or five seconds ; tho' he believed that others, not of his business, nor used to compute by small portions of time, would readily have assigned a minute or two for the duration of the appearance. But I shall suppose Mr. Cairns's measure, corrected by the watch, to be just ; and therefore, as the meteor, in 13 seconds, passed from Cambridge to Fort William, a space of about 400 miles, it must have moved at the rate of about 30 miles in one second of time.

“ hap-

“ happened, at the first appearance of the light, to
 “ be standing close by a south window, and saw the
 “ meteor like a ball of fire, but of an oval figure,
 “ with its longest axis in the direction of its course, of
 “ a size equal to that of the full moon at her greatest
 “ height*; that it moved, with great velocity, from
 “ the south-east † (about which point he first saw
 “ it) towards the N. W. but that he had lost sight
 “ of it about the S. W. by the intervention of a
 “ building on the opposite side of the street, be-
 “ fore it had fallen from its apparent height: that
 “ he observed no tail, nor sparks of fire issuing from
 “ it; and heard no noise after the return of darkness.”
 The doctor added, “That he himself was from home,

* If Mr. Simson lost sight of the meteor duly S. W. of him, it must have then been perpendicularly over the southern part of the shire of Lanerk, about 66 miles from the observer, and about the highest he could have seen it any-where in its course. I shall therefore suppose, that it was at its greatest apparent diameter just before it disappeared; that is, equal to that of the full moon, according to his comparison; consequently its real diameter was about half a mile, upon the like computation with that in the note upon Obs. XXIV. This is the most moderate; for the meteor might have been considerably larger even from this observation.

† Having omitted desiring Mr. Simson to take the bearings with a compass, he has not imagined that I required any greater precision than having the most common points; but as I find Cambridge laid down in all the maps nearly S. S. E. of St. Andrews, and as we have no reason to believe the meteor was lighted to the eastward of Cambridge, it is probable Mr. Simson did not see it till it was nearer to the south than the S. S. E. But supposing this gentleman saw it at its first setting out, viz. over Cambridge, and duly S. S. E. then, from the angle of elevation of $15\frac{1}{2}$ deg. the distance between the two places, and an allowance made for the curvature of the earth, the perpendicular height at Cambridge must have been about 100 miles.

“ at some miles distance, at supper, in a room with
 “ the windows darkened ; so that he neither saw the
 “ light, nor heard any sound.” In a second letter,
 he acquainted me, “ That his son, at my request,
 “ had gone with a friend to the same window men-
 “ tioned above, and, pointing an instrument to that
 “ part of the heavens he recollected to have seen the
 “ meteor in, they had found the apparent altitude,
 “ during the time Mr. Simson saw it, to have been
 “ about 15 degrees and a half. As for the whole time
 “ of its continuance above the horizon, all the ac-
 “ count he could give was, that the body was not
 “ visible to him longer than he could have counted 6
 “ or 7 strokes of his pulse ; but believes, if he had
 “ stood at a higher and an open window, he might
 “ have seen it much longer.”

One of my friends did me the favour to write to
 Bamf and Inverness, in order to learn what had been
 observed in the more northern parts of Scotland ; but
 found the meteor had not been taken notice of at
 either of those places.

XXVII. Believing there was a better chance for
 hearing of its course more to the westward, a gentle-
 man here was so obliging as to procure me the follow-
 ing letter, written by Dr. Alexander Mackenzie, phy-
 sician in the shire of Ross, to a friend of his in the
 same country, on the occasion of this inquiry. “ I am
 “ sorry that the information I can give you about the
 “ meteor, of the 26th of November last, will be so
 “ little satisfactory : however, I shall tell you what I
 “ saw. I must first observe, that where I then was,
 “ viz.

“ viz. at Flowerdale (a gentleman’s house on the
 “ western coast of Rosshire), the view of the heavens
 “ is extremely confined, being quite surrounded, ex-
 “ cept at one point, by very high and close-approach-
 “ ing hills; whence you will understand, that the
 “ meteor must have been high before it could be ob-
 “ served, and that it quickly disappeared, as its pro-
 “ gress was very rapid. Its light was most surpris-
 “ ingly splendid, but not in the least like that of
 “ the sun, except when it shines through a cloud,
 “ or a summer shower. Its magnitude was near to
 “ that of the full moon, when she is three or four
 “ hours high. Its colour not at all like that of the
 “ body of the sun, or an ignited globe, but resem-
 “ bled that of the flame of spirits. Its figure was
 “ quite spherical, without any tail; but it emitted,
 “ or as it were dropped, sparks of various colours
 “ and magnitudes. As for its height, it was vertical;
 “ and its direction was from the west northerly to
 “ the east southerly. I was sensible of no noise
 “ on its disappearance. The time of night was
 “ about nine, and indeed as dark a night as ever I
 “ saw.”

Upon reading this letter, and finding, by Dr. Mac-
 kenzie’s observation, the course of the meteor to have
 been so very different in those parts from what I had
 collected from the other accounts, and believing it
 was beyond all chance, that a new meteor should
 appear at the same place, on the same day, and
 at the same hour when the other was expected, I
 doubted I had either misunderstood that gentleman’s
 expression, with regard to the direction, or that he
 possibly might have made a mistake in the writing;

and

and therefore, to be clear in this circumstance, I wrote to the doctor, desiring to be informed, whether he meant to say, as I understood him, that the course of the body was *from some point a little northward of the west, to some point a little southward of the east*; or otherwise. To which letter Dr. Mackenzie obliged me with this answer. “ Altho’ I regret my being out
 “ of the way of answering your letter in course of
 “ the post, yet, by that absence, I have it now more
 “ in my power to be exact with regard to some of
 “ your queries, as I am just returned from Flowerdale; where, in consequence of the first letter on
 “ the subject of the meteor, I observed narrowly the
 “ situation of the mountains over which it passed;
 “ in order that I might correct my account of its
 “ course, if I had mistaken it before. But, after
 “ that survey, I found my former description exact to a tittle, and your interpretation of my words,
 “ viz. *from the west northerly to the east southerly*, to
 “ be precisely what I meant: they may not be terms
 “ of art, but express the true progress of that body
 “ when I saw it; notwithstanding that I observe, by
 “ your informations from the south of Scotland, and
 “ from Carlisle, its direction was almost directly opposite. What I meant by its vertical height was,
 “ that its declination, if any, was extremely small
 “ from the zenith, but that northerly. Tho’ I continued to gaze for about a quarter of an hour after
 “ it disappeared, I was sensible of no sound, neither
 “ like that of thunder nor a cannon: yet such might
 “ have been in a lesser degree without my hearing it;
 “ as the noise of the sea that night was remarkably
 “ louder, than at any other time, during the whole
 “ month

“ month I was at that place. I can positively assure
 “ you no tail was visible there; tho’, as I said before,
 “ or at least meant to say in my former letter, the
 “ meteor emitted or dropt a great many sparks of va-
 “ rious magnitudes, and most beautiful colours, some
 “ of which seemed to equal the size of half a crown.
 “ My wife and another lady, at fifty miles distance,
 “ almost due east from Flowerdale, saw many such
 “ sparks, but no part of the body of the meteor. The
 “ light, tho’ of the pale moon-colour where I was,
 “ yet was so bright, that I could discover every bush
 “ and tree, every scraggy rock on the tops of the
 “ mountains, altho’ the night, both before and after
 “ its disappearance, was extremely dark, and with-
 “ out a star to be seen. I am not a little surprised
 “ that, considering how early in the night the meteor
 “ made its appearance, not one person, besides my-
 “ self, in all this country, as far as I can learn (and
 “ I have taken pains to inquire), happened to see it;
 “ except you will admit that my wife and her friend
 “ saw some of its tract, from the sparks they ob-
 “ served. And this circumstance leads me to think,
 “ that it made a very quick turn immediately after
 “ its disappearance from my sight, losing its south-
 “ ern direction, and running due east: which, in my
 “ opinion, confirms the ship-master’s report of see-
 “ ing it in the Baltick.”

Thus far Dr. Mackenzie, who, I am persuaded,
 could not be mistaken about the points of the com-
 pass, in a part of the country he is so well acquainted
 with, nor would offer any such account of a fact
 he was not well assured of: so that, upon the
 whole, we must refer this strange curvature in the
 course

course of the meteor to some principle, at first view, very different from the common laws of motion ; but perhaps not altogether inconsistent with them, as I shall endeavour to shew in my next paper *.

I finished my inquiries for the north, by writing to a friend in the isle of Shetland ; but he had heard nothing of the meteor there.

XXVIII. I shall conclude with one account more, which I had from Dublin, in a letter from Mr. Cleg-horn, author of the natural history of Minorca. I imagined, that a tolerable observation from that quarter would be useful, for ascertaining both the height of this body above the earth, and its real magnitude ; and accordingly I received from thence some proper materials for that purpose. Mr. Cleghorn writes, " That altho' the meteor, of the 26th of November, " did most certainly appear at Dublin, as well as in " England, yet few people had observed it with at- " tention, and none, that he could hear of, had com- " mitted any thing to writing, excepting one Mr.

* It seems, from observations made on other meteors of this kind, that the curvature in the path of such bodies is not extraordinary. Thus, one that appeared in Italy in 1719, recorded in the first volume of the Academy of sciences at Bologna, did not pursue its course in a straight line ; for they say, *directio non eadem semper fuit*. Again, in the history of the Royal Academy of sciences at Paris, for the year 1738, we find another mentioned, which had so crooked a motion, that they call it *un mouvement bizarre*. Lastly, I observe, that one of the gentlemen, who gave an account to the Royal Society of the meteor seen, about London, in the year 1741, describes it as first shooting to the north-east, and afterwards to the south-east. See *Philos. Transf.* N° 463. p. 59. *Abr. Vol. VIII. p. 525.*

“ Garret, a good sensible man, with some mathematical learning, whose account he had therefore sent me, in an extract from a register of the weather kept by that person; and to which was subjoined an answer to some queries, that had been put to him, concerning that body.” Here follows the paper.

Extract from a register of the weather, by Thomas Garret, inn-keeper at Island-bridge, near Dublin.

“ November the 26th, 1758, hard blowing weather; wind at south-east. Fifteen minutes past eight in the evening *, a globe of fire about seventeen degrees above the horizon †, due east, moved from south to north, as large in appearance as the moon, but more of a golden colour; it broke and dispersed, like a starry rocket, in small, bright sparkles, nearly before the wind, or as if they passed away with the wind.

* By the difference of longitude, this time answers to about forty-one minutes past eight at Cambridge, about half an hour after eight at Carlisle, about 32 minutes after eight at Ancram, about 26 minutes after eight at Edinburgh, and about 20 past eight at Flowerdale in Rosshire.

† By Moll's map, Dublin is distant from Cambridge about 240 miles (at 60 to a degree); and a line drawn due east from Dublin, cuts the tract of the meteor near the north-east corner of Derbyshire, distant by the same map about 185 miles from Dublin. From these measures, and the apparent height, the real altitude of the meteor at Cambridge must have been about 95 statute miles, and over the corner of Derbyshire about 72 statute miles, allowance being made for the curvature of the earth. This observation, compared with Obs. II. and XXIV. with the notes, makes the obliquity of the course very manifest.

" N. B. Mr. Garret keeps his clock very exact,
" by Glasgows regulator, Christ-Church.

" Emanuel Miller, of Island-bridge, saw this meteor from beginning to ending ; thinks it was above the horizon about half a minute ; and says, that it moved with less rapidity than falling-stars commonly do."

" The following queries were put to Mr. Garret, and his answers are annexed.

" 1. Was it a perfect sphere, or an oblong ball ?

" *Ans.* A perfect sphere.

" 2. With or without a tail ?

" *Ans.* Without a tail.

" 3. Did any sparks of fire issue from it ?

" *Ans.* There did not any sparks issue from it till it broke.

" 4. In what direction did it move, from S. E. to N. W. or otherwise ?

" *Ans.* It moved from S. towards the N *.

" 5. How long did it continue visible ?

Ans. The observer says, he saw it only for the space of three seconds, or the twentieth part of a minute ; but that he is sure it had been visible some time before, he having been called out of his house by his servant on purpose to look at it.

" 6. Was any sound heard like a clap of thunder, or the report of a cannon, after its extinction ; and how long after the disappearance of the light ?

* From that station, the declination to the westward of the north could not be well observed.

“ *Ans.* There was not any sound heard: it was
 “ supposed to be at too great a distance.”

These are all the accounts which I received, at different times, upon this subject. In another paper I shall offer to the Society some remarks, that have occurred to me, upon a careful review of the whole materials.

XXVII. *Some Remarks upon the several Accounts of the fiery Meteor (which appeared on Sunday the 26th of November, 1758), and upon other such Bodies; by John Pringle, M. D. F. R. S.*

Read Dec. 20, 1759. **I**N my last paper, I laid before the Society all the accounts I had received of the meteor, of the 26th of November, 1758; which I could not reduce into a narrower compass, without the hazard of omitting such observations, as might be judged necessary for ascertaining some of the principal circumstances; or without passing over those facts, which, however immaterial they may appear at present, might afterwards afford some light in explaining the nature of these *phænomena*. I have even inserted some particulars contradictory to others, that I imagined more likely to be true, as I myself might be deceived, and as, by preserving the several relations intire, I thereby did most justice to the observers. The deception of the senses, upon the appearance of unusual objects, the short continuance of the meteors, and